

Application Serial No. 10/516,955
Response filed January 13, 2009
Reply to final Office Action mailed October 17, 2008

REMARKS

Claims 14, 15, 16, 18, 19, and 21 are pending and under consideration. Reconsideration is requested based on the foregoing amendment and the following remarks.

Response to Arguments:

The Applicants appreciate the consideration given to their arguments, and the new grounds of rejection. Further favorable consideration is requested.

Claim Rejections - 35 U.S.C. § 103:

Claim 14, 15, 16, 18, 19, and 21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,634,705 to Fedei (hereinafter "Fedei") in view of US Patent No. 2,285,960 to Fechheimer (hereinafter "Fechheimer") and U.S. Patent No. 5,203,399 to Koizumi (hereinafter "Koizumi"). The rejection is traversed. Reconsideration is earnestly solicited.

The last clause of claim 21 recites:

Said machine further comprising flow paths for air cooling.

Neither Fedei, Fechheimer, nor Koizumi teaches, discloses, or suggests "said machine further comprising flow paths for air cooling," as recited in claim 21. Fedei, rather, provides gas cooling, not "flow paths for air cooling" as recited in claim 21. In particular, as described in column 3, lines 42-52:

The housing 13 of the machine is made is nearly gastight as possible, and is filled with a suitable coolant gas, preferably hydrogen, which is used in the illustrated embodiment for cooling the rotor and the stator core. A blower may be mounted on the rotor shaft for circulating the gas within the housing and suitable baffles and ducts may be provided in the housing to control and direct the flow of gas therein. The gas in the machine is maintained at a suitable static pressure which may for example be from 30 to 75 pounds per square inch above atmospheric pressure, although other gas pressures might be used depending on the desired rating of the machine.

Since Fedei provides gas cooling, Fedei has no "flow paths for air cooling" as recited in claim 21.

At page 1, in paragraph [0005] of the subject application appears a reference to "Proceedings of the American Power Conference", Volume 39, Chicago 1977, pages 255 to

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269, in which is used a gastight housing. A corresponding housing is also provided in Fidei, as described above. In the claimed invention, such a housing does not appear because of the required sealing problem. The claimed invention, consequently, requires a lower expenditure, as described at page 2, paragraph [0008] of the subject application. Thus, it is deemed advantageous to combine air cooling with a thermosiphon cooling (cf. page 6, paragraph [0031]) of the subject application. The air circulation is to be effectuated in a known manner, whereby reference is made to EP 0 853 370 A1 and EP 0 522 210 A1 (cf. the mentioned paragraph on page 7). These patents disclose very clearly that therein the air circulation is to be effectuated through a not closed housing.

The final Office Action acknowledges in the first paragraph at the top of page for that:

Fidei, US 3634705 does not expressly disclose "air cooling".

The final Office Action seeks to compensate for this deficiency of Fidei by combining Fidei with Fechheimer, continuing in the first paragraph at the top of page 4 that:

Fechheimer, US 2285960 teaches the equivalence between air and hydrogen cooling in the field of electrical generator cooling, see column 1 lines 15 and 16.

Fechheimer, however, seeks to *avoid* using either air or hydrogen cooling. Fechheimer, in particular, describes the physical dimensions of dynamo electric machines as making it desirable to employ for cooling a heat conveying medium which has heat absorbing and heat transfer properties *superior* to those of air and hydrogen. In particular, as described in column 1, lines 11-16:

The physical dimensions of such machines are greatly affected by their ability to dissipate the heat developed therein and it is therefore desirable to employ for cooling a heat conveying medium which has heat absorbing and heat transfer properties superior to those of the two gases theretofore used; namely, air and hydrogen.

Fechheimer, consequently, teaches away from modifying Fidei as proposed in the final Office Action, since Fechheimer seeks to employ a heat conveying medium with properties superior to those of air and hydrogen. It is submitted, therefore, the persons of ordinary skill in the art at the time the invention was made would not have modified Fidei as proposed in the final Office Action, since Fechheimer teaches away from employing air and hydrogen.

The final Office Action, in any case, asserts further in the first full paragraph at the top of page for that:

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At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to replace the hydrogen cooling system of Fidei, US 3634705 with an equivalent gas cooling system. One of ordinary skill in the art would have been motivated to do this to reduce the hazard of using hydrogen.

Fidei, however, already provides gas cooling, as discussed above. Replacing the gas cooling system of Fidei with an equivalent gas cooling system would consequently have done nothing.

Fechheimer, for its part, was trying to avoid using either air or hydrogen, as discussed above. It is submitted, therefore, that persons of ordinary skill in the art at the time the invention was made would not have been motivated to modify Fidei as proposed in the final Office Actions since 1.) Fidei already provided gas cooling, and 2.) Fechheimer was trying to avoid using air or hydrogen.

The 11th clause of claim 21 recites:

The coolant is circulated by a thermosiphon effect with boiling and vaporizing, the coolant being heated or partially vaporized in the discrete coolant areas and being flowing by natural convection without mechanically pumping.

Neither Fidei, Fechheimer, nor Koizumi teaches, discloses, or suggests a "coolant is circulated by a thermosiphon effect with boiling and vaporizing, the coolant being heated or partially vaporized in the discrete coolant areas and being flowing by natural convection without mechanically pumping," as recited in claim 21. The final Office Action acknowledges that Fidei does not show coolant circulated by a thermosiphon effect with boiling and vaporizing, the coolant being heated or partially vaporized in the discrete coolant areas, and seeks to compensate for it by combining Fidei with Koizumi, saying in the second full paragraph at page 4, that:

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to replace circulation pump 55 of Fidei, US 3634705 with a thermosiphon system of Koizumi, US 5203399. One of ordinary skill in the art would have been motivated to do this so that no separate pump is needed.

The cooling technique according to Fidei, however, concerns a cooling system of a stator of an electric machine, in which in a closed system is effectuated a so-called "forced cooling" of a coolant in liquid or gaseous state. Therein is not contemplated an evaporation and a renewed condensation of the coolant, as in the claimed invention. A separate pump such as an external pump or compressor, rather, is absolutely necessary for the circulation of the coolant in Fidei.

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The cooling system of Fidei, conversely, would not function without such a pump/compressor. In particular, as described at column 4, lines 7-13:

The coolant fluid for the stator winding is preferably a suitable liquid such as water and is circulated through the winding by means of an external pump 33. The pump circulates the coolant liquid discharged from the machine through a cooler 34 of any suitable type and through an entrance pipe 35 which passes through the housing 13 and is connected to the intake manifold 30.

It is submitted, therefore, that persons of ordinary skill in the art at the time the invention was made would not have been motivated to exchange such a forced cooling system of Fidei for thermosiphon cooling according to Koizumi, since the cooling system of Fidei would not function without a pump/compressor.

Fidei, moreover, *intends* to obtain effective cooling of the stator winding by providing a closed recirculating system which is entirely separate from the cooling system for the rotor and stator core. In particular, as described at column 4, line 16-20:

In this way a closed recirculating system is provided which is entirely separate from the cooling system for the rotor and the stator core, so that more effect of cooling of the stator winding can be obtained.

The cooling system of Fidei will not operate without a pump, as discussed above, and consequently the dynamoelectric machine of Fidei will overheat if it is run without a pump. The dynamoelectric machine of Fidei is not meant to overheat, since then it could not cool a stator. Thus, modifying Fidei as proposed in the final Office Action would render Fidei unsatisfactory for its intended purpose of cooling a stator, as well as inoperable, in contravention of M.P.E.P. § 2143.01. As provided therein:

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

Since the cooling system of Fidei could not cool a stator if it overheated, and the dynamoelectric machine of Fidei would only run without pump 55 until it overheated, modifying Fidei as proposed in the final Office Action would render Fidei unsatisfactory for its intended purpose of cooling a stator. There is thus no suggestion or motivation to make the proposed modification, *In re Gordon*.

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Koizumi, for its part, describes no thermosiphon effect at all, and thus cannot make up for the deficiencies of Fedei with respect to claim 21 in any case. Koizumi, rather, relies on one or more check valves formed in said closing loop pipe line and allowing only one way flow of said heating medium from said heat receiving section to said radiating section direction. In particular, as described in the Abstract:

A cooling apparatus as one embodiment of a heat transfer apparatus of the present invention comprises a closing loop pipe line means enclosing a predetermined amount of liquid heating medium inside, a heat receiving section receiving heat from an object to be cooled, and transferring heat to said heating medium in said closing loop pipe means, a radiating section taking heat away from said heating medium in said closing loop pipe means, and one or more check valves formed in said closing loop pipe line and allowing only one way flow of said heating medium from said heat receiving section to said radiating section direction.

Since Koizumi relies on one or more check valves formed in said closing loop pipe line and allowing only one way flow of said heating medium from said heat receiving section to said radiating section direction, Koizumi has no "coolant is circulated by a thermosiphon effect with boiling and vaporizing, the coolant being heated or partially vaporized in the discrete coolant areas and being flowing by natural convection without mechanically pumping," as recited in claim 21. Thus, even if Fedei, Fechheimer, and Koizumi were combined as proposed in the final Office Action, claim 21 would not result.

Koizumi, in fact, teaches away from using natural circulation such as a thermosiphon effect, when he notes that such systems have not been effective in situations other than where heat density and transfer density requirements are low. In particular, as described at column 1, lines 17-23:

In a heat transfer apparatus for cooling, heating, and air conditioning, heat transfer utilizing natural circulation has been widely used. However, in actual use, such systems have not been effective in situations other than where heat density and transfer density requirements are low.

It is submitted, therefore, that persons of ordinary skill in the art of the time the invention was made would not have modified Fedei as proposed in the final Office Action, since Koizumi describes systems using natural circulation as not effective in situations other than where heat density and transfer density requirements are low.

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Koizumi also teaches away from using a thermosiphon effect when he describes the circulation force of the heating medium to be restricted in a system using no gravity, and a heat pipe as having been used only limitedly. In particular, as described at column 1, lines 40-46:

In a system using no gravity, since the circulation depends on a delicate force, which is based on "wetting action (a kind of a capillary phenomenon" of a maintaining material, which is called "wick", circulation force of the heating medium is restricted. Therefore, the heatpipe has been used only limitedly, and a pump is generally used for the circulation of the heating medium.

It is submitted, therefore, that persons of ordinary skill in the art of the time the invention was made would not have modified Fedei as proposed in the final Office Action, since Koizumi describes the circulation force of the heating medium to be restricted in a system using no gravity.

The ninth clause of claim 21 recites:

Said cooling line system thermally coupling said cold head to the heat generating parts of said stator to be cooled with the stator winding, having discrete coolant areas associated with the heat generating parts of said stator to be cooled and being thermally conductively connected over a large area to the stator parts to be cooled.

Neither Fedei nor Koizumi teach, disclose, or suggest a "cooling line system thermally coupling said cold head to the heat generating parts of said stator to be cooled with the stator winding, having discrete coolant areas associated with the heat generating parts of said stator to be cooled and being thermally conductively connected over a large area to the stator parts to be cooled," as recited in claim 21.

Neither Fedei nor Koizumi, in fact, mentions a cold head at all, let alone a "cooling line system thermally coupling said cold head to the heat generating parts of said stator to be cooled with the stator winding, having discrete coolant areas associated with the heat generating parts of said stator to be cooled and being thermally conductively connected over a large area to the stator parts to be cooled," as recited in claim 21. Thus, even if Fedei, Fechheimer, and Koizumi were combined as proposed in the final Office Action, claim 21 would not result. Claim 21 is submitted to be allowable. Withdrawal of the rejection of claim 21 is earnestly solicited.

Claims 14, 15, 16, 18, and 19 depend from claim 21 and add additional distinguishing elements. Claims 14, 15, 16, 18, and 19 are thus also submitted to be allowable. Withdrawal of the rejection of claims 14, 15, 16, 18, and 19 is earnestly solicited.

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Conclusion:

Accordingly, in view of the reasons given above, it is submitted that all of claims 14, 15, 16, 18, 19, and 21 are allowable over the cited references. There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

If there are any formal matters remaining after this response, the Examiner is invited to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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